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Reliability of special protection systems

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Abstract

Special protection systems (SPS) have been widely used to increase the transfer capability of the network by assisting system operators in administering fast corrective actions. Compared with constructing new transmission facilities, SPS can be placed in service relatively quickly and inexpensively. However, increased reliance on SPS results in additional risks to system security. The purpose of this paper is to elucidate the importance of developing a systematic and comprehensive reliability framework for SPS. We review types of SPS and provide several examples of actual SPS failures. The need for SPS reliability assessment is discussed. Several reliability assessment methods are described, and efforts to deal with a similar problem in the process control industry are summarized. We also provide several recommendations

Index Terms

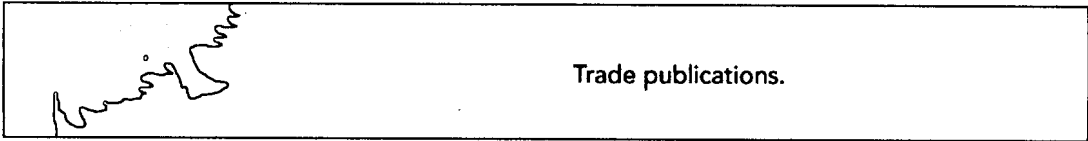
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Comparing safety analysis techniques

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Abstract

In process industry Safety Instrumented Systems (SIS) and Emergency Shutdown Systems (ESD) are very important for the management/reduction of risk. In new standards (e.g. Ref. [1]) on functional safety of electrical/electronic/programmable electronic safety-related systems a quantification of the achieved safety is often required. These new standards do not prescribe how to calculate the achieved safety. Only guidelines and recommendations are given. The problem with this approach is that all kinds of different analysis techniques will be used and in industry the results of the analysis will be compared. These different analysis techniques all use different methodologies and assumptions, which implies that the results may not be comparable. In this paper an approach for comparing different analysis techniques and the qualitative and quantitative results from this comparison are described. The author suggests that, because of the differences in the analysis techniques, one analysis technique is to be preferred. The Enhanced Markov Analysis technique, described in this paper, could be used for this purpose because it covers most aspects relevant for quantification of safety.

Author Keywords: IEC61508; Standards; Quantification of safety; Analysis techniques

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